Amendments To The Claims

Please cancel Claim 6 without prejudice. The following list of the claims replaces all prior versions and lists of the claims in this application.

1. (Previously presented) A measurement cell and magnet arrangement for an ion cyclotron resonance (ICR) mass spectrometer, comprising:

a magnet assembly including a superconducting magnet having a room temperature magnet bore with a longitudinal axis, the superconducting magnet being arranged to generate a magnetic field with field lines that extend in a direction generally parallel with the said longitudinal axis; and

an FT-ICR measurement cell arranged within the bore of the superconducting magnet, the cell having cell walls within which is defined a cell volume for receiving ions from an external ion source, the cell extending in the direction of the longitudinal axis of the superconducting magnet and being generally coaxial therewith;

wherein the ratio, R, of the sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the said longitudinal axis, is less than 4.25.

2. (Original) The arrangement of claim 1, wherein the magnet bore and the measurement cell are each generally right cylindrical, and wherein the diameter of the magnet bore is less than 150mm.

3. (Original) The arrangement of claim 2, wherein the diameter of the magnet bore is greater than 100mm, and wherein R is less than 2.85.

4. (Original) The arrangement of claim 2, wherein the diameter of the magnet bore is less than 100mm, and wherein the diameter of the inside of the cell walls that define the cell volume is at least 48.6mm.

5. (Currently amended) The arrangement of claim 1, wherein the magnet assembly further includes a housing arranged to receive the ~~electro-magnet~~ superconducting magnet, the housing defining a housing bore which is smaller than the magnet bore, the housing bore being adapted to receive the measurement cell.

6. (Canceled).

7. (Original) The arrangement of claim 1, further comprising an evacuable chamber which receives the measurement cell, the evacuable chamber being arranged in use within the magnet bore.

8. (Previously presented) The arrangement of claim 1, wherein the axial centre of the measurement cell is arranged away from the geometric centre of the superconducting magnet in the axial direction.

9. (Previously presented) The arrangement of claim 8, wherein the superconducting magnet has an asymmetric winding so that the magnetic centre in the direction of the longitudinal axis of the magnet bore is different from the geometric centre in that direction.

10. (Previously presented) The arrangement of claim 1, wherein the superconducting magnet is arranged to generate a magnetic field which is substantially homogeneous over a length, in the direction of the longitudinal axis of the magnet bore, of at least 70mm, and wherein the length of the cell, in that same direction, is likewise at least 70mm.

11. (Original) The arrangement of claim 1, wherein the measurement cell has a front face defining an opening through which the ions are received from an upstream direction, and wherein the measurement cell is cantilevered or supported from a location in that said upstream direction.

12. (Original) The arrangement of claim 11, wherein the measurement cell is movable relative to the magnet assembly.

13. (Original) The arrangement of claim 1, wherein the measurement cell has a front face defining an opening through which the ions are received from an upstream direction, a rear face opposed to the said front face, a plurality of electrodes to generate an electric field across the cell volume, and detector means, the rear face including at least one external electrical contact adapted to engage with at least one of a corresponding power supply contact and/or detector signal processing means.

14. (Original) The arrangement of claim 13, wherein the measurement cell is movable relative to the magnet assembly.

15. (Previously presented) An ion cyclotron (ICR) mass spectrometer, comprising:

an ion source arrangement to generate ions to be analysed;

an ion storage device arranged to receive and trap the generated ions;

ion optics arranged between the ion source and the ion storage device to guide the ions as they pass from the source into the storage device;

a measurement cell having cell walls within which is defined a cell volume for receiving ions from the ion storage device;

ion guide means arranged between the ion storage device and the measurement cell to guide and focus the ions from the ion storage device into the measurement cell for mass spectrometric analysis therein; and

a magnet assembly, including a superconducting magnet which has a room temperature magnet bore arranged to receive the measurement cell, the magnet bore having a longitudinal axis;

wherein the measurement cell extends in the direction of the longitudinal axis of the magnet bore and is generally coaxial therewith, and wherein the superconducting magnet is arranged to generate a magnetic field with field lines that extend in a direction generally parallel with the said longitudinal axis of the magnet bore, and wherein the ratio, R, of the sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the said longitudinal axis, is less than 4.25.

16. (Original) A mass spectrometer comprising:

an ion source for generating ions to be analysed;

an ion trapping device to receive the generated ions;

ion optics means to guide the ions from the source into the ion trapping device;

an FT-ICR mass spectrometer having a measurement cell located within a bore of a magnet, the cell being downstream of a front face of that magnet, the FT-ICR mass spectrometer further comprising detection means to detect ions injected into the measurement cells;

ion guiding means arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum therein; and

a power supply for generating an electric field to accelerate the ions between the ion source and the measurement cell;

wherein the power supply is configured to supply a potential which accelerates ions from the source or the ion trapping device to a kinetic energy E and to decelerate the said ions at a

location only immediately adjacent the front of the measurement cell, and downstream of the front face of the magnet.

17. (Original) The mass spectrometer of claim 16, wherein the power supply is arranged to accelerate the ions to a kinetic energy of in excess of 20eV for substantially all of the path from the ion trapping device to the said location immediately in front of the measurement cell.

18. (Original) The mass spectrometer of claim 16, wherein the power supply is arranged to accelerate the ions to a kinetic energy, E, of in excess of 20eV for substantially all of the path from the ion source to the said location immediately in front of the measurement cell.

19. (Original) The mass spectrometer of claim 17, wherein the power supply is arranged to accelerate the ions to a kinetic energy, E, in excess of 50eV.

20. (Original) The mass spectrometer of claim 16, wherein the power supply is configured to accelerate the ions to the said kinetic energy, E, for at least 90% of the distance from the ion trapping device to the measurement cell, or for at least 90% of the distance from the ion source to the measurement cell.

21. (Original) The mass spectrometer of claim 16, wherein the ion guiding means comprises at least one injection multipole ion guide.

22. (Original) The mass spectrometer of claim 21, wherein the ion guiding means comprises a plurality of injection multipole ion guides in series with one another.

23. (Original) The mass spectrometer of claim 22, wherein each injection multipole ion guide has a longitudinal axis, and wherein the alignment of the axis of each ion guide with a subsequent and/or preceding ion guide is less than about 0.1mm.

24. (Original) The mass spectrometer of claim 21, wherein the multipole ion guide(s) define(s) an inner volume through which the ions pass towards the cell, and wherein the maximum radius of that inner volume of the ion guide(s) is less than 4mm.

25. (Original) The mass spectrometer of claim 24, wherein the multipole ion guide(s) define(s) an inner volume through which the ions pass towards the cell, and wherein the maximum radius of that inner volume of the ion guide(s) is less than 2.9mm.

26. (Original) The mass spectrometer of claim 21, wherein the ion guiding means further comprises at least one lens for focussing the ions.

27. (Original) A method of mass spectrometry comprising:

(a) at an ion source, generating ions to be analysed;

(b) guiding the generated ions into an ion trapping device;

(c) ejecting ions from the ion trapping device;

(d) guiding the ions ejected from the ion trapping device into an FT-ICR mass spectrometer which has a measurement cell located within a bore of a magnet, the cell being arranged downstream of a front face of that magnet;

(e) accelerating the ions from the ion source or the ion trapping device to the measurement cell of the FT-ICR mass spectrometer;

(f) decelerating the ions at a location only immediately upstream of the measurement cell, that location being downstream of the front face of the magnet; and

(g) detecting the ions within the measurement cell.

28. (Original) The method of claim 27, wherein the step (e) comprises accelerating the ions to a kinetic energy E in excess of 20eV.

29. (Original) The method of claim 28, wherein the step (e) comprises accelerating the ions to a kinetic energy E in excess of 50eV.

30. (Original) The method of claim 27, wherein the step (e) comprises accelerating the ions to a kinetic energy E for a distance that exceeds 90% of the distance between the ion source and the measurement cell.

31. (Original) The method of claim 27, wherein the step (e) comprises accelerating the ions to a kinetic energy E for a distance that exceeds 90% of the distance between the ion trapping device and the measurement cell.